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ABSTRACT

Fourth in the series "101 Environmental Education Activities" by the Upper Mississippi River ECO-Center, the booklet contains 39 environment-based science activities directed to students in primary, intermediate, and junior high classes. Organization of the activities usually includes grade level, objectives, procedures, and materials, evaluation criteria, and sometimes includes hints and follow-up activities as well. In general, emphasis is placed on learning about soils; weather; various life forms; ecological and environmental relationships; conservation; natural phenomena; and on enhancing the students' powers of observation, sensory awareness, and awareness of environmental problems. Activities include science and energy surveys, weather observations and predictions, soil study and analysis, tree study, plant and animal observations, and specimen collection. Field trips to forest, timber, marsh, and river areas, as well as new housing developments and waste disposal plants help students examine many aspects of their environment from the point of view of various sciences. (SB)

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101 ENVIRONMENTAL EDUCATION ACTIVITIES

BOOKLET #4

SCIENCE ACTIVITIES

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UPPER MISSISSIPPI RIVER ECO-CENTER
TITLE III-ESEA
THOMSON, ILLINOIS

-1975-

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The Upper Mississippi River ECO-Center
Title III, ESEA
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by
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101 Environmental Education Activities

Booklets:

1. Art and Music Activities
2. Language Art Activities
3. Mathematics Activities
4. Science Activities
5. Science and Social Studies (Interdisciplinary) Activities
6. Social Studies Activities

SCIENCE

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b	Temperatures
c	Interdependence of Life

TOUCH AND SEE

Discipline Area: Science

Grade Level: First and Second

Objectives:

1. Children will better understand that they can learn more of nature by using all their senses.
2. Children will understand that things in some catagories have likenesses and differences.
3. Children will better understand the importance of close examination and comparison in identifying things in their environment.

Procedure:

I. A box of objects in several different catagories is assembled. There should be several examples in each catagory.

Note: Our box included:

3 kinds of fur
several kinds of oak leaves and acorns
several kinds of evergreens and cones
rocks-granite, talc, sandstone, agate, limestone
fossils-any we could find
insect work-gulls: goldenrod and oak
bark bettle work
termite work
insect nest-wasps: paper and mud
a beaver chewed log
fungus
seeds-several pods and seeds
nuts-several kinds

II. Objects are displayed on tables so that children may look and feel.

III. Staff members are present to answer questions, but not to tell what things are unless asked.

IV. After all children have examined objects, a staff member leads a discussion about likeness and differences. Importance of noting differences when examining things is brought out by noting difference in people and discussing the confusion that would result if everyone looked just alike.

OPTIONAL FOLLOW-UP REVIEW FOR #1

Alike and Different

We saw oak leaves and acorns.
We learned that all oaks have _____.
We learned that all acorns are or are not alike.

We saw different kinds of bark.
How was the bark different?
How do you explain different kinds of bark?

What is an evergreen tree?
Tell two ways in which evergreens are different.
Tell two ways they are alike.

The fur you felt was different.
Why was it different?

Tell two ways in which rocks are different.

How were the nuts alike?
How were the nuts different?

What happened to wood which has been in water for a long time?
What had the beavers done to the wood?
What had insects done to the wood?

How old was the tree whose rings you counted?

What made some of the soil dark?
How do you describe how sand feels?

We saw two kinds of wasp nests. What were they made of?
Can you tell how wasps made paper?
Why do wasps make nests with all of those tiny cells?

THE WORLD OUTSIDE YOUR WINDOW — Activity # 2

SUGGESTIONS FOR INITIATING THE UNIT

Third graders may not necessarily see a value in looking out the window for the purpose of recording raw sensory data and impressions. Certainly, the idea of going to the window is not painful, and in fact, many a child would prefer it to sitting at a desk for long periods of time. How then do we legitimize "window gazing" during the school day both in our own mind and in the child's mind?

"The World Outside Your Window" is a broad conceptual theme that allows flexibility in teaching approach. As with any learning activity, the teacher would prefer positive motivation and eagerness channeled in ways that not only reward the students, but also make teaching a pleasure. Helping children see purpose in participating in this unit should greatly help in its success.

The following are a few suggestions for the use of the enclosed student guide sheets.

1. Preview all the work sheets. The initial step will be to divide your class into groups of 4 or 5. They will be working in groups throughout the unit. Some preliminary work may be needed to help the class understand how a group would work in recording observations, so as not to disturb others, and so that time can be used wisely. If you feel it necessary, conduct a practice session looking around the room for a few minutes.

The first student guide sheet is very simple. The groups will go to the window and look out. One member of the group will act as a recorder. You may want to assign recorders. They are to make a list of everything that the group sees. Time spent at the window, 5 minutes. Use your own discretion on spelling. A folder to hold observation sheets is needed by each group and should be out so the groups can get them easily.

2. The second sheet has the students return to the window for another observation. This time the groups will be looking for things that fit into these catagories: (1) On the school grounds, (2) off the school grounds (3) things that are farthest away. You may find it necessary to define the catagories. On the school grounds, means list objects they see on the school grounds. Off the school grounds, objects seen off the school grounds and farthest away are those things seen far from the window. At the bottom of the sheet is a short review to see if they saw more the second time

than the first. They will need to get their first guide sheet to answer these questions.

3. Student guide sheet 3 takes the catagory idea one step farther and breaks the catagories down even more. This time they are looking for living, non-living, natural and man-made objects on the school grounds and far away; items listed may overlap catagories.

On the back of guidesheet 3 are some necessary items that must be completed before going on. The groups is asked to choose one object from each of the four sub headings found on the front side of the sheet. The selection will be used to complete guidesheet 4. Also they are to choose where they would like to have a picture taken and who, within the group, will go with a teacher to have it taken. The picture should be of something or an area within the world outside the window. Please keep it within walking distance. Time spent at the window for this sheet: not more than 15 minutes.

4. The staff will be coming to your classroom very shortly and there are a few things that need to be completed before the staff arrives. Be sure guidesheets 1,2,3 have been finished, and the children have easy access to them as they will be needed during the ECO-Center visit. Each group should have chosen four objects for further study as listed on the back of student guidesheet 3. Th Their choices will be used to complete guidesheet 4. Also the groups should have the place and person chosen to see that the picture is taken. The area for the picture should be within walking distance of the school. The picture will be used as part of the groups' report to the class. Groups will need help with discussing and answering questions on sheet 4.

Visitation Day Agenda

1. Divide into groups.
2. Complete guidesheet 4 and have picture taken.
   (1 or 2 people go outside to look closer(if necessary)
3. Fill in Report Form
   (Each group makes report.)
4. Make report.

5. Guidesheet 5 is used as a guide for each group reporting to the class. This sheet is used as the beginning of the review process. The guide helps the student explain what they saw, understand that repeated viewing usually leads to more things, find out

more about the world outside the window, and find out what they like the most. You will need to decide if the group should work on the report as a whole or assign one part to a member of the group.

Follow-up Study

6. You may wish to carry the review process even further by doing some of the suggested continuation activities.

1. Draw a map of the world outside the window.
2. Write a story about the world outside the window.
3. Make a picture story about the world outside the window.
4. Put together a scroll and narration.
5. Put on a play.
6. Make a movie.
7. Run the unit again in the spring.
8. Have the children report on the world outside their window at home.

This unit may take many directions and we are interested in what happens in each class. The possibilities are unlimited.

This unit has been produced by the Upper Mississippi River ECO-Center in cooperation with Dr. Morris Weiner of Lorado Taft Field Campus, N.I.U.

#1

Activity # 2

FIRST STUDENT GUIDESHEET Sheet # 1

YOUR GROUP WILL GO TO THE WINDOW. LOOK OUT. HAVE ONE PERSON IN YOUR GROUP MAKE A LIST OF EVERYTHING THAT YOUR GROUP SEES.

SECOND STUDENT GUIDESHEET

YOUR GROUP WILL GO TO THE WINDOW. LOOK OUT. LIST THE THINGS YOUR GROUP SEES UNDER THE FOLLOWING HEADINGS. LOOK CAREFULLY.

THINGS ON THE SCHOOL GROUNDS	THINGS OFF THE SCHOOL GROUNDS	THINGS THAT ARE FAR AWAY

GET YOUR FIRST GUIDESHEET FROM YOUR GROUP FOLDER. ANSWER THE FOLLOWING QUESTIONS.

1. Count the number of items on sheet one.....How many are there?___
2. Count the number on sheet two....How many are there?_____
3. Which sheet had the longer list?_____

THIRD STUDENT GUIDESHEET

YOUR GROUP WILL GO TO THE WINDOW WITH GUIDESHEET 3. LIST THE THINGS YOU SEE UNDER THE FOLLOWING HEADINGS.

THINGS ON THE SCHOOL GROUNDS

LIVING	NON-LIVING	NATURAL	MAN-MADE

THINGS OFF THE SCHOOL GROUNDS

LIVING	NON-LIVING	NATURAL	MAN-MADE

THINGS FAR AWAY

LIVING	NON-LIVING	NATURAL	MAN-MADE

(over)

After your group is done:

Choose one thing from the list on the other side that your group would like to take a closer look at.

A. The living thing we would like to look closer at is

_____

B. The non-living thing we would like to look closer at is

_____

C. The natural thing we would like to look closer at is

_____

D. The man-made thing we would like to look closer at is

_____

A teacher from the ECO-Center will be visiting your classroom soon. Your group is to select a <u>place</u> or <u>object</u> that the group is really interested in to have a picture taken. The picture will be part of your groups final report.

Place or object to have picture taken

_____

Group member who will help ECO-teacher take picture

_____

FOURTH STUDENT GUIDESHEET

AFTER YOU HAVE EXAMINED YOUR OBJECT CLOSELY ANSWER THE FOLLOWING QUESTIONS. WORK IN YOUR GROUPS. EACH GROUP WILL HAVE A BINOCULAR TO USE AND MAY APPOINT SOMEONE TO TAKE A CLOSER LOOK OUTSIDE.

LIVING OBJECT _____

1. How do you know the object is living?

   _____

2. What is its color? _____
3. Will its color change in a different season? _____
4. What is its shape? _____
5. Is the outside of your object smooth or rough? _____
6. What is it good for? _____

NON-LIVING OBJECT _____

1. How do you know that the object is non-living?

   _____

2. What is its color? _____
3. Will its color change in a different season? _____
4. What is its shape? _____
5. Is the outside of your object smooth or rough? _____
6. What is it made of? _____
7. What is the object used for?

   _____

NATURAL OBJECT _____

1. How do you know that the object is natural?

   _____

2. What is its shape? _____
3. What is its color? _____
4. Will it change color in a different season? _____

(over)

NATURAL OBJECT _____
(cont'd)

5. Is the outside of your object smooth or rough? _____
6. What is the object good for?

MAN-MADE OBJECT _____

1. How do you know the object is man-made?

_____

2. What is its shape? _____
3. What is its color? _____
4. Will its color change in a different season? _____
5. Is the outside of your object smooth or rough? _____
6. What is it made of? _____
7. What is it good for?

_____

THE WORLD OUTSIDE OUR WINDOW

REPORT FORM

Group Members

_____

_____

_____

_____

_____

_____

_____

_____

1. We saw many things when we looked out the window. Count the number of things you listed on
   Sheet 1 _____
   Sheet 2 _____
   Sheet 3 _____

   Did you see more each time? Yes_____ No _____

2. We selected these things for further study.
   1. _____
   2. _____
   3. _____
   4. _____

3. Some things you learned about the world outside our window. (Look at Guidesheet 4. It will give you help.)

_____

_____

_____

_____

(over)

Report

4. Some things you liked about the world outside our window.

CREATIVE LISTENING

Activity: Activities designed to open the sensory systems

Discipline Area: Science

Grade Level: Primary and Intermediate

Objective:

1. Children learn to use other senses than sight.

Activities:

1. List the sounds in a department store.
2. Make a list of sounds you hear during a timed period.
3. Compile a list of "squashy" things.
4. Make a list of things that hurt.
5. Make a list of things made more beautiful by age.
6. Make a list of sour things.
7. Make a list of wet things.
8. Make a list of things that chill.
9. Compile a list of twilight colors.
10. List things that crumple in your hands.
11. List things found in two's.
12. Make a list of happy things.

SCHOOL ENVIRONMENTAL SCIENCE SURVEY Activity # 4

You are to examine your total school site for areas of possible pollution and waste. Also areas of use where energy is used and/or misused.

The most used item in a school is by far the use of paper. You are asked to carry out a survey of areas and people in and around your school to check on the amount and use of paper and the amount and method of discarding waste in your school. Keep records for 3 or 4 weeks.

A. Restroom-- Ask the students in your class how many towels they used when they wash their hands. Record each day the amount used and put your results on a graph.

B. Classroom-- Between classes count the number of sheets of paper in the waste basket which have been written on only one side. Is there a big enough amount to call it wasteful? Keep a record for 2 or 3 weeks and record your results on a graph.

C. Office-- Ask the secretary how much paper she uses each day. Check the waste basket for paper that could be used again for scratch paper or for notes. If there is some that could be used again, ask her why she doesn't use it again. Record her answer.

D. Kitchen-- Ask the cooks how much food is wasted each day. What types of things are most often thrown away? What do the cooks do with the containers that the food comes in? If you feel that their method of disposing of the containers is not good for the environment ask them why they do it that way and if they think there could be a better way. If there is a better way, why don't they use it?

E. Janitor-- Ask him how many bags of paper he collects every day. How does he get rid of the paper? If you feel this way of getting rid of the paper is not good for the environment ask him why he does it this way and if he couldn't find a better way of doing it. Record his response.

F. Teacher-- Ask your teacher to keep a separate basket or bag for all the things he or she throws away during the school day. Do not let them change their habits, but just use a separate container. Look over the things thrown away to see if any of those things could realistically be reused. Look closely over the paper thrown away and count the number of sheets that were thrown away that could be reused. Record your count on a graph.

G. School Grounds--Count the amount of trash that is found on your school grounds (paper and cans). Keep a graph for each day of the amount of paper and the amount of cans you find. Notice day to day changes, try to

explain why. During the last recess of the day pick up all the trash.

Along with the school survey an interview with the local school Principal or Superintendent will help in your investigation of the energy crisis in your school. This can be done at a later date than at the time you do the items on Page 1.

You will have to write a letter to your Superintendent or Principal asking him to come to your class to answer the questions listed below. Enclose in your letter a copy of the questions and allow him plenty of time to respond to your request.

Have every thing well organized so it can go smoothly. Have people ready to ask questions and a person prepared to welcome him to the class and at the end of the interview to thank him for coming.

QUESTIONS

A. What kind of energy is used to heat our school?

Have we had trouble getting fuel? If yes, why?

B. Of the fuel we use how much do we use during a school year?

Could this amount be cut down? If yes, are we doing it?

If no, why not?

C. Are all classrooms and offices set at the same temperature?

If no, why not?

D. How much does it cost for electricity for this school building?

Where is the most electricity used? Why?

Are there places where we could cut down on our use of electricity?

If yes, are we cutting down and where are these places?

If there are places and we are not cutting down, why not?

If no, why aren't there any places to cut down on our use?

#4

ENVIRONMENTAL SCIENCE

Activity: School Environmental Science Survey

Discipline Area: Science

Grade Level: Junior High

Objectives:

1. By making a systematic survey the pupils will better understand how wastefulness adds to the solid waste problem.

2. Children will better understand that the problems of solid waste and conservation of natural resources can be attacked at the local level.

ACTIVITIES: On separate sheet.

INSECTS

Activity: Ten-minute field hike

Discipline Area: Science

Grade Level: Primary

Objectives:

1. Children will become aware of the wide variety of insect life found near the school or their homes.
2. Children may better understand the position of insects in an ecological cycle.

Equipment: Plastic bottles and bags, hand lens.

Activity: On a short hike find:

insects
insect chewed leaves
insect eggs
plant galls
insect homes

For further study, pupils may collect insects in plastic bottles or bags. Unless the pupils are making collections, it would be wise to limit the insects to one of a kind. Eggs and nests may also be collected.

Classroom Follow-up

Examine an insect closely under your hand lens.

1. How many parts is its body divided into? 1___ 2___ 3___ 4___
2. From which part of the body did the legs come? 1___ 2___ 3___
3. Did the insect have wings? YES ____ NO____
4. If it had wings from which part of the body did they come? 1___ 2____ 3____
5. How did your insect move? Fly____ Walk____ Swim____ Both fly and walk____
6. What color was your insect? _____
7. Did you find any insects that live in the ground? YES____ NO____
8. Where did you find the most insects? Leaf litter___ Tree trunks____ Leaves____ Soil____ Grass____
9. Why do insects eat leaves?_____

10. Name some of the places you found insect homes. _____
_____

11. What causes plant galls?_____

SECOND FOLLOW-UP LESSON

This lesson is for older pupils who can use reference works.

There are more kinds of insects in the world than all other animals combined. There are about three-fourths of a million kinds of insects. Some insects are helpful and some cause harm or damage.

1. Find the names of two insects that are harmful to livestock.
_____

2. Name three insects that are harmful to crops. _____
_____

3. Find the names of two insects that carry diseases. _____
_____

4. Name two diseases that are carried by insects. _____
_____

5. Name two insects that help man. _____

6. Name an insect that provides a food. _____

7. Name an insect that is beneficial to orchards. _____

8. Name an animal that eats insects. _____

Insects belong to the arthropod group in the animal kingdom. Name five other animals of the arthropod group.

1._____
2._____
3._____
4._____
5._____

Name the three body parts of an insect.

1._____
2._____
3._____

An insect has how many legs? _____

An insect usually has how many pairs of wings? _____

Insects have how many pairs of antennae? _____

What is the outer covering of an insect called? _____

Further Study

Make an insect collection. Use the Zim Golden Nature Guide for directions for collecting and preserving.

Examine the insect with a hand lens. Identify the various parts.

Find how such noise making insects as locusts and katydids produce their sound.

Compare insects and spiders.

ENERGY

Activity: Uses of energy in the home

Discipline Area: Science

Grade Level: Intermediate and Junior High

Activities:

1. Children will be given a list of energy users in the home. Each will check whether it uses electricity or gas (or some other source), check if they have it in thier homes, and then ask their parents and grandparents (or someone of approximate age) to check those in their homes when they were children.

2. Children will learn the names of the companies supplying their energy.

3. Children will find out what each company uses as its source of energy, and where the company gets its supply.

Evaluation: Children will prepare graphs showing the growth in the use of energy from approximately 1915 to the present time.

A similar lesson could be made up for the uses of power on the farm, in shops, and in other businesses.

ENERGY USERS IN THE HOME

Appliance	Type of Energy	Now	About 1945	About 1915
stove				
lights				
refrigerator				
television				
radio				
water heater				
freezer				
clothes dryer				
fan				
furnace				
vacuum cleaner				
washer				
air conditioner				
hair dryer				
toaster				
fry pan				
organ				
dishwasher				
blender				
mixer				
toothbrush				
saw				
sander				
power tools				
garbage disposal				
garbage compactor				
blanket				
phonograph				
razor				
knife				
hedge trimmer				
garage door opener				
mower				
can opener				

Can you think of others?

STREAM STUDY

Activity: Science Survey

Discipline Area: Science

Grade Level: Intermediate

Introduction: A small area, if carefully selected, will provide a wealth of information and knowledge. An area with a variety of features should be selected and a small group of students assigned to stations. Each group will be assigned a specific area to map and run tests, however, other tests will require that you move out of your area and survey more of the stream, being careful not to upset others work.

Objectives:

1. General study of the area
2. Ecological relationships
3. Conservation
4. Pollution

Physical and Biological Study

Instructions

1. Try not to disturb any more than necessary
2. Work upstream in collecting all samples
3. Safety! Do not wade in unmarked areas!!

Physical

1. Speed (flow and speed in various areas of the stream)
2. Width and depth (contour, mapping depth and width)
3. Amount of water moving
4. Turbidity
5. Note obstructions, sedimentary deposits
6. Oxbows, meanderings, age of stream
7. Water samples (take in undisturbed area)
8. Stream flooding - evidence
9. Bank cutting and undercutting - look for examples of erosion

cont.

10. Temperature
11. Condition of watershed

Biological:

1. Animal life in streams, along the shore
2. Start keying of animals and a rough count of % of same
3. Birds - stream, types and how they benefit man
4. Mammal signs - tracks and learn the importance of animals to the stream
5. Study a food chain of the stream (make a food chain)
6. Make aquarium using fresh water fish
7. Plant life in streams, rivers, lakes - any differences
8. Microscopic study of micro and macro organisms - take sample

Pollution:

1. Obvious signs of pollution
2. Effect of cattle lots and pasture on a stream
3. Where does pollution come from
4. Note effects of man's interference

Conservation:

1. Study of what can be done in the area of a stream to aid conservation
2. Is conservation necessary in a small stream community, in a large stream and so forth?
3. Effect of land speculators on a stream such as damming up a stream to create a lake
4. Cleaning up project

Equipment Per Group	Equipment Gotten From Instructor
Siene - 1	Stopwatch
Thermometer - 1	Measuring tape
Net - 1	ph paper
Minnow trap - 1	
Corks - 1	
Sample bottles - 5	
Minnow bucket - 1	
Turbidity stick - 1	
Yard stick - 2	
Clip board - one per student	

Siening and live sampling should be taken up stream in an undisturbed area following the work in your assigned area.

Each person will be required to submit a detailed report of the stream study (all aspects) and turn in approximately one week after the study.

Note taking on the scene is very important as this will be the basis of your report.

WEATHER RECORDS

Activity: Weather Records

Discipline Area: Science

Grade Level: Intermediate

Objectives:

1. Pupils learn to keep detailed weather records
2. Pupils learn to read the barometer, learn cloud formations, and learn to estimate wind velocity
3. Pupils learn to watch weather signs to predict weather

Equipment:

1. Barometer
2. Thermometer
3. Cloud type chart

Activities:

1. Make weather charts
2. Set definite period for recording weather
3. Make daily checks and record
4. Examine record for given period and draw conclusions for weather pattern for given climatic area for given season
5. Learn and watch for weather signs

Evaluation: Pupils are to be evaluated on thoroughness of records and how preceptive their conclusions are for weather patterns.

8 Cont.

WEATHER CHART

Temperature	Wind Velocity	Barometric Pressure	Cloud Type	Humidity	Wind Direction	Weather Type	Date

WEATHER

I. CLOUD CLASSIFICATION

1. CUMULUS - MEANS PILED UP AND PUFFY
2. STRATUS - MEANS SHEETLIKE OR LAYERED

II. CLOUD NAMES - RAIN

1. NIMBUS - RAIN CLOUDS
2. (PREFIX) FRACTO - WIND BLOWN CLOUDS THAT ARE BROKEN INTO PIECES
3. ALTO - HIGH USED IN MIDDLE LAYER HIGH CLOUDS

III. HIGH CLOUDS

1. CIRRUS - THIN, WISPY, AND FEATHERY
2. CIRROCUMULUS - THIN, PATCHY, WAVE LIKE PATTERNS
3. CIRROSTRATUS - THIN SHEETS (LOOK LIKE FINE VEILS)

IV. MIDDLE CLOUDS

1. ALTOSTRATUS - SHEETS OF GRAY OR BLUE
2. ALTOCUMULUS - PUFFY OR ROLL LIKE

V. LOW CLOUDS

1. STRATUS - LOW, QUITE UNIFORM SHEETS - USUALLY ONLY FINE DRIZZLE CAN FALL
2. NIMBOSTRATUS - TRUE RAIN CLOUDS
3. STRATOCUMULUS - IRREGULAR MASSES OF CLOUDS (DO NOT PRODUCE RAIN)
4. CUMULONIMBUS - THUNDERHEADS
5. CUMULUS - MEAN FAIR WEATHER (UNLESS THEY PILE UP INTO CUMULONIMBUS)

WEATHER SIGNS

I. WEATHER WILL GENERALLY REMAIN FAIR WHEN: the wind blows gently from west or northwest. Barometer remains steady or rises. Cumulus clouds dot the summer sky in the afternoon. Morning fog breaks or "burns off" by noon.

II. RAINY WEATHER OR SNOW MAY COME WHEN: Cirrus clouds thicken and are followed by lower clouds (particularly true if barometer is dropping). There is a ring around the moon (particularly true if barometer is dropping) puffy cumulus clouds

cont.

begin to develop. Sky is dark and threatening to the west. Southerly wind increases in speed with clouds moving from west. The wind-particularly a north wind-shifts in a counter clockwise direction-that is, form north to west to south. Barometer falls steadily.

III. WEATHER WILL GENERALLY CLEAR WHEN: Bases of clouds show steady rise to higher types. The wind, particularly an east wind, shifts to the west. The barometer rises rapidly.

IV. TEMPERATURE WILL USUALLY FALL WHEN: Winds blow from, or shifts to, north or northwest. Night sky is clear and winds are light. The barometer rises steadily in winter.

V. TEMPERATURE WILL USUALLY RISE WHEN: Wind is from the south, particularly with cloud cover at night or clear sky during the day.

DO-IT-YOURSELF FORECAST

1. A heavy dew promises a fair tomorrow (rainy night sky absorbs dew, clear sky does not absorb dew).
2. Dull moon and stars foretell rainy tomorrow (fuzzy and pale-rain sharp points, clear)
3. Birds and bats fly low before a rainy spell (lowering pressure irritates their ears, so they seek higher pressure near the ground.
4. Red sky a sunset is a sign of a fair tomorrow (a sunset sky is air which will reach you tomorrow. Dry air produces a red glow, wet air produces a yellow gray glow).
5. Lowering pressure causes trapped odors to escape.
6. Lighting from the westerly sky is from a storm on the way to you
7. Distant shores loom "near" before a rainy day. (Unstable air mixes up the haze to make things appear near)
8. Sounds seem nearer and hollow before a rainfall (lower ceiling gives echo effect to airplane drone and train whistles)
9. Smoke curling downward indicates poor weather.

ESTIMATING WINDS ON THE BEAUFORT SCALE

MPH/KNOTS	DESCRIPTION	OBSERVATION
0-1 / 0-1	calm	smoke rises vertically
1-3 / 1-3	light air	smoke drifts slowly
4-7 / 4-6	slight breeze	leaves rustle
8-12/ 7-10	gentle breeze	leaves & twigs move
13-18/11-16	moderate breeze	small branches move
19-24/17-21	fresh breeze	small twigs sway

MPH/KNOTS	DESCRIPTION	OBSERVATION
25-31/22-27	strong breeze	large branches sway
32-38/28-33	moderate gale	whole trees in motion
39-46/34-40	fresh gale	twigs break off trees
47-54/41-47	strong gale	branches break
55-63/48-55	whole gale	trees snap & are blown down
64-72/56-63	storm	widespread damage
73-82/64-71	hurricane	extreme damage

(Rapid Rise or Fall 0.05 to 0.09 Inches or More in 3 Hours)

WIND DIRECTION	BAROMETRIC PRESSURE	GENERAL FORECAST
SW To NW	30.10 to 30.20 Barometer steady	Fair with little temp. change for 1 to 2 days
SW To NW	30.10 to 30.20 Rising Rapisly	Fair with warmer weather and rain within two days
SW To NW	30.20 or above steady	Remaining fair with little temperature change
SW To NW	30.20 or above Falling slowly	Fair & slowly rising temperature
S To SE	30.10 to 30.20 Falling slowly	Rain within 24 hrs.
S To SE	30.10 to 30.20 Falling rapidly	Rain within 12 to 24 hrs, wind will rise
SE To NE	30.10 to 30.20 Falling slowly	Rain within 12 to 18 hrs., wind will rise
SE To NE	30.10 to 30.20 Falling rapidly	Rain within 12 hrs. wind will rise
SE To NE	30.00 or below Falling slowly	Rain will continue 1 or more days
SE To NE	30.00 or Below Falling rapidly	Rain with high wind in few hrs., clearing within 36 hrs. Colder in winter
E To NE	30.10 or above Falling rapidly	Summer, with light winds; rain in 2 to 4 days, winter rain or snow in 24 hrs.

cont.

WIND DIRECTION	BAROMETRIC PRESSURE	GENERAL FORECAST
E To NE	30.10 or above Falling rapidly	Summer: Probable rain in 12 to 24 hrs. Winter rain or snow within 12 hrs.
S To SW	30.00 or below Rising slowly	Clearing within a few hrs. then fair for several days
S To E	29.80 or below Falling rapidly	Severe storm in few hrs. then clearing within 24 hrs. colder in winter
E To N	29.80 or below Falling rapidly	Severe storm in few hrs. heavy rain or snow followed by cold
SW To W	29.80 or below Rising rapidly	End of storm clearing and colder

SCIENCE EXPERIMENTS

FROM: Outdoor and Environmental Education Manual, Metropolitan Nashville-Davidson County Schools

Activity: Science Experiments with matter, color, gravity, and machine tools.

Discipline Area: Science

Grade Level: Intermediate

Objectives:

1. Children will better understand the importance of colors in the absorption of heat.
2. Children will better understand the process of freezing by experiments.
3. Children will learn that gravity plays an important part in the balance of nature.
4. Children will be able to identify examples of simple tools in nature.

Matter exists in various forms: solid, liquid, and gas

(activities)

Heat activity: testing the reaction of color to heat
Cut squares of cloth or paper, making them all the same size but of different colors. Have the children place the squares lightly on the snow on a sunny day when there is no wind to blow the squares away. Leave these squares on the snow several hours. Then remove them and observe the amount of snow that has melted under each one. Ask the children to discuss the result of this experiment in terms of how different colors absorb heat and what colors of clothing are best in various seasons.

Liquid activity: experimenting with freezing liquids
Gather a variety of containers made of different materials (tin, glass, plastic, cardboard, aluminum, iron, steel, brass, and rubber.) Fill these containers with water and place them outside in cold weather so that the water will freeze. Observe the freezing process, noting the part of the containers the water freezes first.

All things fall

(activities)

Considering gravity: The force of gravity is usually taken for granted. Help the children to see the importance of gravity in keeping the balance of nature. Seeds drop to the ground in order to take root and grow new plants. Rain falls, bringing life to plants and animals. Animals that

cont.

live on the surface of the ground may obtain their entire food supply from falling objects such as nuts and fruit. Leaves and dead branches that drop from trees decay and enrich the soil for plant life.

Encourage the children to find as many examples in nature as they can of the importance of gravity. For instance, frogs have large and strong hind legs to help them jump against gravity's force; and the wings of birds can be both strong and light to overcome gravity.

Machines are tools of work

(activities)

Recognizing some simple machines: examples
The woodpecker's bill acts as a wedge in splitting pieces of wood; the woodsman's ax illustrates the wedge.

Levers: Oars are used to row a boat; a fishing pole or rod operates as a lever in the hands of a fisherman. A person lifts something and his arms act as levers operating with the elbow as fulcrums. A seesaw illustrates the law of the lever.

HOW SOIL IS MADE

Activity: Soil study, How soil is made

Grade Level: Lower elementary

Discipline Area: Science

Objectives:

1. Through experiments children will learn how soil is made from rocks.
2. Children will learn how humus is added to soil.

Materials Needed:

1. Pieces of soft rock such as weathered limestone or sandstone.
2. Flat pans
3. Hot plate
4. Glass jar
5. 3 M transparencies, Erosion No. 11,12,13
6. Top soil from wooded area. This should contain decayed and undecayed material.

Activities:

1. View transparencies
2. Rub two soft rocks together over a paper. Observe resulting dust or sand grains.
3. Heat rocks in flat pan over a hot plate. Pour cold water over rocks or with tongs plunge them into cold water. Observe results.
4. This experiment will have to be preformed when temperature is below freezing, or jar may be put into freezer. Fill a glass jar with water, screw a lid on tightly, and put in freezing area. Leave overnight. Observe results.
5. Spread topsoil on papers. Observe different stages of decomposition. Observe any animal life.

Evaluation: Pupils write a paragraph recording results and conclusions from each experiment.

THE MOVING OF SOIL

Acitvity: Ways in which soil is moved

Discipline Area: Science

Objectives:

1. Children will learn that soil is not constant
2. Children will learn how wind and water affect soil
3. Children will learn how man moves soil

Activities:

1. On a field trip try to locate areas where soil has been moved by water and wind. (It may be necessary to take several trips choosing days after a rain or when the wind is blowing).
2. Collect boxes of dry soil for experiments. Collect sand, loam, and clay.
3. Pour water on soil types to show how they wash. Try a gentle spray and fast running streams. Notice how soil is redeposited.
4. Use an electric fan to show how wind moves soil. Notice which soils move the most.
5. Observe difference in effect between a gentle breeze and hard wind.

Evaluation: Each child should be able to set up and perform one experiment.

EROSION

Activity: Erosion

Grade Level: Fourth or Fifth

Discipline Area: Science

Objectives:

1. Pupils will learn to set up and carry out experiments.
2. Pupils will learn ways of preventing erosion by doing experiments.

Materials Needed:

1. flat pans
2. flat boxes
3. sprinkling cans
4. glass jars
5. cans
6. 3M transparencies, Erosion No. 19, 20, 24, 26
7. sod and bare soil

Activities:

1. View transparencies of experiments
2. Set up and perform activities shown in transparencies

Evaluation: 70% of pupils should each write a paragraph describing results and conclusions from experiments.

GERMINATION AND GROWTH

Activity: Seed Study

Discipline Area: Science

Objectives:

1. Children learn parts of seeds.
2. Children learn how seeds germinate.

Materials Needed:

1. Seeds
2. Pots for planting
3. Soil

Activities:

1. Children open seeds to identify different parts.
2. Seeds may be mounted and parts identified or drawings may be made to show the same things.
3. Children find requirements of seeds for germination.
4. Class divides into groups to plant seeds. Each group plant one pot of seeds with ideal germination conditions and other pots as controls; e.g. one pot lacks water, another is kept too warm and/or too cold, and one too deep so oxygen is cut off.
5. Pupils keep charts recording results.

Evaluation: Written reports of conclusions reached by controlled experiments.

PLANT GROWTH RECORD

13 cont.

POT NUMBER	DATE PLANTED	DATE SPROUTED	GROWTH IN 1 WEEK	GROWTH IN 2 WEEKS	REMARKS

USES OF SEEDS AS FOOD

Activity: Seed Study

Discipline Area: Science, Social Studies

Objectives:

1. Children will learn what a seed is.
2. Children will learn how seeds are used as food.

Activities:

1. Children consult reference works to determine what is meant by the term "seed".
2. List the seeds eaten in the past week.
3. List the ground seeds eaten in the past week.
4. List the discarded seeds of the past week.
5. Complete chart of seeds used in different forms.

Evaluation: Completed charts.

Further optional activities:

1. Display of edible seeds.
2. World map showing great grain producing areas.
3. Maps may be marked to show areas producing other food seeds, e.g. coffee, chocolate, and spices.
4. Bulletin board displays pertaining to food seeds.

FOOD SEEDS - HOW WE USE THEM

KIND OF SEED	WHOLE	GROUND	BEVERAGES	FLAVORING	OIL

Activity: Visit to a Beaver Dam

Discipline Area: Science

Objectives:

1. Pupils will learn of the life and habits of beavers.
2. Pupils will learn of the effect of beavers on the environment.

Activities:

1. Hike to beaver dam and lodge.
2. Observe:
   a. what dam is made of
   b. what lodge is made of
   c. how water is backed up
   d. activity on banks
3. Measure the diameter of largest tree beavers have felled.
4. Observe plant life in pond.
5. Observe how beavers change the environment.
6. Photograph dams and lodges.
7. Make plaster casts of tracks.
8. Study beavers.
9. View films and slides.
10. Make a diorama of a beaver dam and lodge.

Evaluation:

Teacher evaluation according to how pupils reach goals set. May be no evaluation.

Resources:

Usinger, Robert L., The Life of Rivers and Streams
Murie, Olaus, Field Guide to Animal Tracks
Burt, William Henry, A Field Guide to Mammals
Zim, Herbert I., Mammals
Chase, Myron and Charles, Field Guide to Tracks
Film: The World of the Beaver

Activity: Mini climates

Discipline Area: Science

Objective:

1. Children learn that temperature of snow is not constant.

Materials needed:

1. thermometers
2. notebooks
3. pencils

Activities:

1. Take temperature of snow in an open area. Record.
2. Take temperature of snow in a sheltered area. (by a building or tree). Record.
3. Measure air temperature in areas where snow temperature has been recorded. Record.
4. Record range of temperatures.
5. Find average temperature.
6. Record differences in air and snow temperatures.
7. Conclusions.

Evaluation: Teacher makes careful check on pupils' conclusions. Evaluation can be made by class discussion.

Animal Identification

Activity: Identifying animals by their tracks

Discipline Area: Science

Grade Level: Intermediate, junior or senior high school.

Objectives:

1. Pupils will increase knowledge of life in a given area.
2. Pupils will increase powers of observation in the field.
3. Pupils will learn something of animals'habits by tracks.

Materials needed:

notebooks
pencils
good track guides

If casts are to be made: plastic, mixing container mixing spoon, water, and cardboard strips.

Directions for making casts are found in most of the field guides.

Animal Tracking (Adapted from Bettendorf Outdoor Education Program.)

The winter months offer excellent opportunities for animal tracking and tracks can be found almost everywhere if there is snow on the ground. After the first excitement of just seeing tracks is over many things can be learned from tracks, if some good observation is done. Much like a detective uses finger prints for identification, so can tracks of animals be used since each animal leaves a distinctive track.

One thing that confuses people when looking at tracks is the fact that some animals register while other animals do not.

What is registering you ask? In tracking it means the placing of the hind foot into the impression made by the front foot. Why do animals do this? Animals that find their prey by stalking are able to see where to place their front feet and not break twigs or in some way make a noise. Then by placing the hind feet in the exact spot, they can silently move from place to place. Running animals do not register, because obviously there is no need for it. Dogs have lost their ability to register, while the wolf, when walking or stalking, will register. If you find cat tracks, they will show perfect registering. Do not let this ability of animals fool you when you are looking at tracks.

Clues you can read from tracks:

1. Have a rough, tough boy in your class make a bare footed track in a handy bit of snow, and then make the following observations.
   (a) size
   (b) shape
   (c) location of toes
   (d) number of toes
2. Now go and locate a series of animal tracks. Compare these tracks with those of a human.
   (a) size
   (b) shape
   (c) location of toes
   (d) number of toes
3. Make a drawing of the observed animal track, and indicate its measurement.
4. Make the following observations about the tracks you have found:
   (a) Do they register?
   (b) Was the animal running or walking?
   (c) What is the spacing of the tracks?
   (d) Is each print spaced evenly in a trail?
   (e) Are there two, three or four tracks bunched together?
   (f) How far apart are the groups?
   (g) Using a ruler, measure the size of individual tracks and the amount of spacing between groups of prints.
   (h) How deep are the prints? (Clue to weight of animal)

Animal Tracking (cont'd.)

(i) Does the animal walk flatfooted or on its toes?
(j) Was the animal alone?
(k) Age of track (old or fresh)

Remember, animal tracks can be found anywhere around your school if there is snow on the ground. When things get a little slow during January and February take a little time and have a unit on animal tracks. It isn't really necessary to know what the track is, to make the above mentional observations; but if you wish to have more information on tracking, we have some home made track cards.

Activity: Bud watching in spring

Discipline Area: Science

Grade Level: Intermediate

Objectives:

1. Children will better understand that even in winter trees and shrubs are getting ready for spring.

2. A study of buds helps children to better understand the difference in kinds of trees and shrubs.

Materials needed:

pencils, clip boards, and work sheets

Activities:

Children will choose several trees to examine. After careful examination and discussion, children will fill in work sheets.

Later visits to the same trees will help children to understand how buds produce leaves.

A fall visit to the same trees will show the children how the trees have grown and how they are making new buds.

BUD WATCHING SPRING

In the late fall or winter there are no leaves on the deciduous trees. The buds are on the tree waiting for the spring.

1. Find a bud on a limb . . If it is at the end of the stem it is called a TERMINAL bud. If it is on the sides of the branch it is a LATERAL bud. Decide on one bud to study and tie a piece of colored yarn on it so you will be able to find it again. Is your bud terminal or lateral?_____

2. Draw a sketch of the bud _____

3. When spring comes the bud will swell . . . The terminal bud at the top of the stem produces growth of the stem, the end or terimal bud at the end of the branch makes the branch grow longer and the lateral buds make new twigs that will grow into longer branches. Which thing will your bud do? _____

4. Some buds may be flower buds...These may open before the leaves come; do you see any of these buds on your limb?_____

5. Look along the stem....Notice the scar, this is where the terimal bud opened. Count the number of scars (they go around the stem or twig) on the branch. How many are there? _____This count will tell you how old the branch is, as each branch makes one terminal bud a year...Follow it to the trunk. Is this limb as old as you are?_____

6. Is the length the same between the bud scars? _____Why?_____

7. If the leaves are out you will notice that new buds are being made for growth next spring. (Do you find these buds?)_____

8. Look at the pictures on the bud clue page....See if you can find the name of your tree by looking at the buds. Name_____

9. Find the leaf scars on your branch. How many do you find?_____

"YOUR TREE"

Activity: Study of a class tree

Discipline Area: Science

Grade Level: Primary, intermediate, junior high

This lesson may be made simple enough for primary children or expanded for older children. The study of diameters, board feet and soil studies would be omitted for primary grades. The program may be expanded to the uses of the type of lumber for the junior high.

Objectives:

1. Children will better understand the part of the tree in the ecology of the area.

Activities:

1. Make booklets. Record the data from study sheets in the booklets. Photographs may be used instead of or in addition to the drawings.

Questions on "Your Tree"

Put answers in your tree booklet.

1. Draw the shape of the tree.

2. Select a leaf.

3. Draw whether the branches are opposite or alternating Draw.

4. List any damage to the tree and draw:

   holes
   small tunnels
   eaten leaves
   broken branches
   fungus plants (looks like shelves, pieces of white bread, hard moss on branches)
   aphids (tiny green insects on leaves)
   lichens (flat plants on trunk, green or gray).

5. Any companions around?

   tracks
   nests
   homes in holes
   webs
   woodpecker holes
   caterpillars
   ants
   butterflies, moths
   other insects
   birds
   squirrel

6. Draw a map of where your tree is located:

   size of tree
   height of tree
   diameter
   number of board feet
   bark color

7. Take a sample of soil:

   a. surface
   b. six inches below surface
   c. several feet away from tree
      Test the samples; keep for booklet.

8. Check your tree later in the year and add any new things you may see.

UMECO TITLE III-ESEA

WATER ANALYSIS

Polluted water is water that has been used so that it has lost its usefulness. Water is valuable because it is necessary for so many things, and when it isn't fit for the uses that we have at hand, we are concerned. Activities that depend upon the right kinds of water are restricted and values are lost.

Saying that water has been made useless by earlier uses shows the great variety of needs we have for water; for drinking, for crops and animals, for washing, cooling, transportation, waste removal, manufacturing, recreation, and hundreds of other necessary activities. The kind of water that is best for any single use may be very different from the kind needed for another, so that changes in water quality can be very important in a region where there are a number of large uses. It's not that we are running out of water, we simply have to use the water sources that we must share in common so that the new needs can be met.

WATER INVESTIGATION

1. Do you feel it is necessary for carbon dioxide to be present in water supplies?

   Why or why not?

2. What happens if there is too much carbon dioxide in the water?

   Too little?

3. Now run the carbon dioxide test on the water samples, one from the main lake and one from the second pond.
   Record your results:

4. We know that oxygen is important to animals and plants that live on land. How about those that live in the water?

   Who or what needs oxygen?

5. What happens if their is too little oxygen in the water?

   Too much?

(over)

WATER INVESTIGATION

6. Run the dissolved oxygen on the two water samples and record your results.

Can the ponds support life?

Read the section on nitrate to gain information about nitrogen in the water. Run the nitrate test and record your results.

Results:

If you determine that the nitrogen content is too high what might cause this high reading?

What are the sources of nitrogen in the water? Think about the site we are using.

1

SOIL STUDY

ESTIMATING TEXTURE

Clay Silty Clay Sand Clay	Fine - textured -	If you can easily form a long ribbon the soil is fine-textured.
Silty Clay Loam Clay Loam Sandy Clay Loam	Moderately fine-textured -	A ribbon forms but breaks into pieces 3/4 to 1 inch long, the soil is moderately fine-textured.
Sandy Loam Fine Sandy Loam	Moderately coarse-textured -	If a ribbon can not be formed and the soil feels very gritty, the soil is moderately coarse-textured.
Loamy Sand Sand, gravel	Coarse-textured -	if soil consists almost entirely of gritty material and leaves little or no stain in the hand, the soil is coarse-textured.

WHAT THE SOIL NEEDS

WHAT LIME DOES

Lime works as a team with fertilizers to produce high yields of better quality crop. Liming without adequate fertilization seldom is sufficient for satisfactory growth.

WHAT NITROGEN DOES

Nitrogen is an essential constituent of proteins. An abundant supply of nitrogen results in dark green foliage and active vegetative growth. For vegetables in which leaves, stalks or stems are the important end product extra nitrogen should be fed to the soil Extra nitrogen should be present in town soils if you want a heavy rich emerald carpet of grass.

Too much nitrogen causes too rapid growth, softness of tissue and a general weakness of the plant. This is particularly true in woody and flowering plants. Too much nitrogen at flowering time causes the plant to resume active vegetative growth, retarding flower and seed formation.

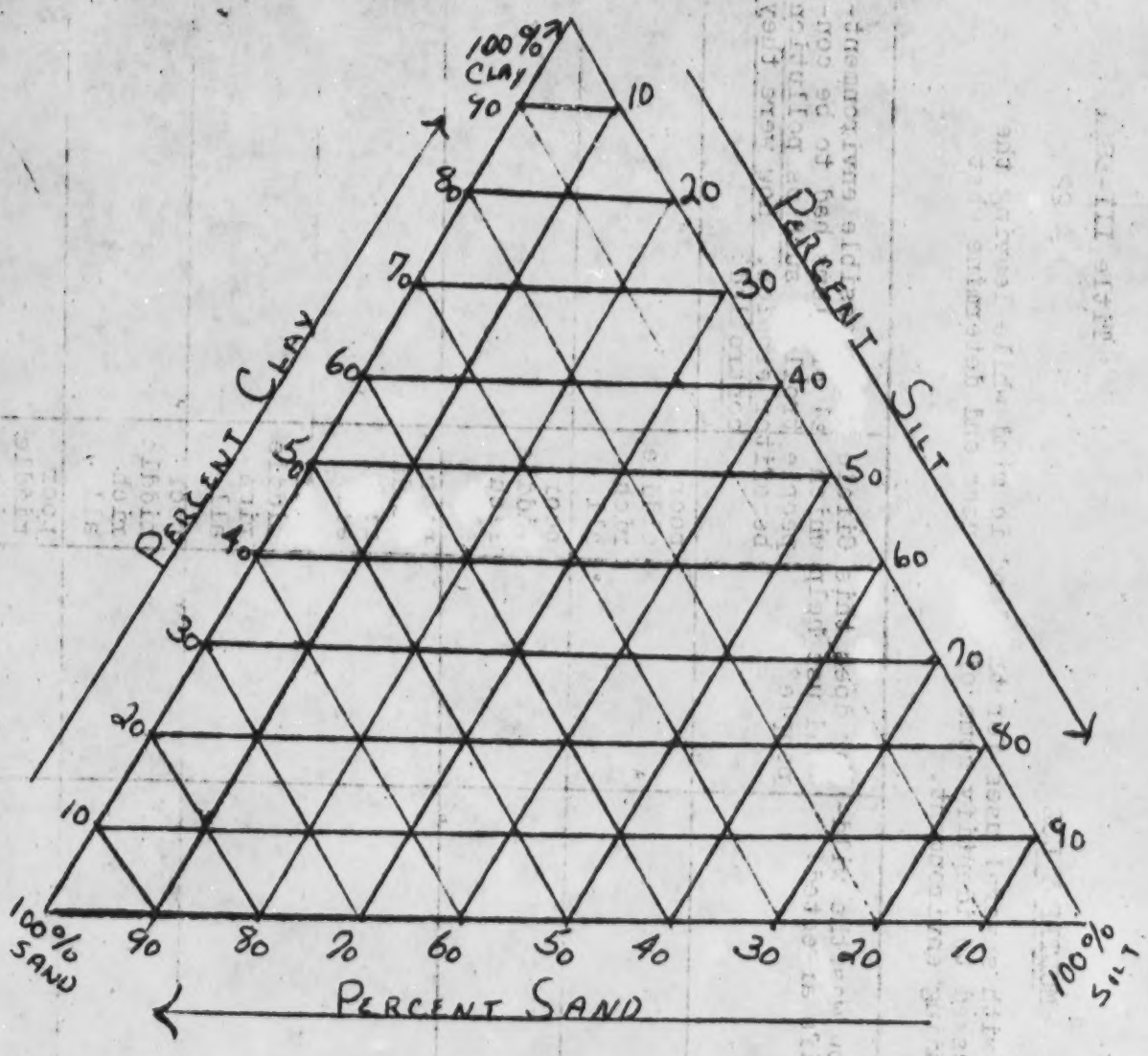
WHAT PHOSPHOUS DOES

Phosphours stimulats early root formation and growth, gives a rapid and vigorous start to plants, stimulates blooming and aids in seed formation. Phosphours hastens maturity and gives winter hardiness to fall-seeded grains and hay crops.

(over)

WHAT POTASH DOES

Potash is important in the formation and transportation of starch, sugar and other carbohydrates within plants. It produces strong stiff stalks and imports increased vigor and digor and disease-resistance to plants. Root, tuberous and bulb plants respond well to potash. Excess potash results in an increase in the water content of plants making them susceptable to draught and frost injury.



This diagram shows the relative sizes of three kinds of soil particles even though they have been enlarged about 60 times, the clay particle can barely be seen.

Name _____

Title III-ESEA

6th Grade Field Activity

MULTIPLE USE

22

Timber Lake Resort has been developed with several uses for the land in mind while leaving the natural beauty of the area. You are asked to identify some of these uses and determine what affect each use has had on the surrounding environment.

Use of the Land	What changes in the land were made so this use could be done?	How was the wildlife affected?	How does this land use help people?	Circle which people benefit	What possible environmental problems had to be controlled? such as pollution or erosion. How were they controlled?
1.				poor middle rich all	
2				poor middle rich all	
3.				poor middle rich all	
4.				poor middle rich all	
5.				poor middle rich all	
6.				poor middle rich all	

MULTIPLE USE

Use of the Land	What changes in the land were made so this use could be done?	How was the wildlife affected?	How does this land use help people?	Circle which people benefit	What possible environmental problems had to be controlled? such as pollution or erosion. How were they controlled?
7.				poor middle rich all	
8.				poor middle rich all	
9.				poor middle rich all	

In developing the area the owners have followed sound _____ practices.
Using the same area for several uses is called _____ - _____.
Regulations controlling the use and development of land is called _____.

RESORT MANAGEMENT STUDY

Title III-ESEA

CHECK SHEET

I. What legal requirements might be necessary before a resort could be established?

1. _____
2. _____
3. _____

II. Give five requirements for a good site.

1. _____
2. _____
3. _____
4. _____
5. _____

III. When the owner starts to develophis site list 10 things he must do before he can open the camp to the public.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

IV. The owner wishes to have swimming facilities. List 10 things necessary before the swimming area can be opened to the public.

1. _____
2. _____
3. _____
4. _____
5. _____

CHECK LIST

IV. The owner wishes to have swimming facilities. List 10 things necessary before the swimming area can be opened to the public.

6. _____

7. _____

8. _____

9. _____

10. _____

V. The Lake is large enough for water craft. List four types of water craft acceptable on a small lake that is also used for swimming.

1. _____

2. _____

3. _____

4. _____

Should the use of outboard motors be prohibited? If so, why?

_____

VI. Why is a store desirable? List three reasons.

1. _____

2. _____

3. _____

List five problems that might come up when plans are made for a store.

1. _____

2. _____

3. _____

4. _____

5. _____

VII. If the lake is used for fishing what has to be done first?

_____

_____

CHECK LIST (cont'd)

VIII. List ten problems a camp manager might encounter.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

IX. After the restaurant is built and a manager hired, list ten problems that the manager might encounter.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

X. How can rodents be controlled?

_____

_____

How can insects be controlled?

_____

TRY THIS AROUND YOUR SCHOOL OR PARK WITH YOUR STUDENTS AS A SIMPLE OUTDOOR EDUCATION ACTIVITY OR MAKE UP YOUR OWN.

NAME _____ DATE _____

WEATHER

A. Clear & Sunny
B. Dark & Rainy
C. Windy & Dark
D. Windy & Clear
E. Other

THINGS HAPPENING

___1. An insect walking
___2. A tree budding
___3. A spider web
___4. Water working
___5. (Add other items)

THINGS TO TASTE

___1. Evergreen tree needle
___2. A piece of tree bark
___3. Evergreen tree sap
___4. A sumak berry
___5. (Add other items)

THINGS TO SMELL

___1. Clean air
___2. A hole
___3. Crushed evergreen needle
___4. Dirt
___5. An unpleasant smell
___6. A pleasant smell
___7. (Add other items)

THINGS TO SEE

___1. A bird
___2. Evergreen tree
___3. Raccoon tracks
___4. A seed
___5. Insect house
___6. Lichens
___7. A white tree
___8. Gall
___9. White oak leaf
___10. Red oak leaf
___11. A pond creature
___12. Old birds nest
___13. Other tracks
___14. A feather
___15. (Add other items)

THINGS TO HEAR

___1. Wind in trees
___2. Machine sounds
___3. Bird singing
___4. Water running
___5. Leaves rustling
___6. Animal calling
___7. Farm animal noise
___8. (add other items)

THINGS TO FEEL

___1. Prickly plant
___2. Warmth from sun
___3. Wind
___4. Smooth bark
___5. Rough bark
___6. Running water
___7. Moss on rocks
___8. Rotten wood
___9. (Add other items)

This activity was borrowed from the Bettendorf Outdoor Education Program.

"TEN-MINUTE WALK # 24

Grades 4-5

Concepts:

1. Some surfaces are porous, others, non-porous.
2. All form of precipitation must be absorbed by the soil, evaporated, or redistributed by artificial means.
3. Most man-made structures prevent rainfall from entering the soil.

Activities:

1. Go out to the school playground, measure a 100-ft. distance.
2. Each person in the group walk the 100-ft. distance at a normal pace counting the number of steps. Then determine the average length of your step.
3. Divide the group into four subgroups. Assign each subgroup to determine the dimensions and area in square feet of the following:
    a. school building
    b. school ground
    c. sidewalks and other concrete surfaced areas
    d. parking lot and other asphalt covered areas
4. Determine the percent of the school ground which is covered by:
    a. school building
    b. asphalt
    c. concrete
    d. other

Questions:

1. What happens to water when it falls on grass? What happens to water when it falls on asphalt, concrete, and building surfaces?
2. What percent of the school grounds will allow water to be absorbed by the soil? What percent of the school ground area can be considered non-porous to water?
3. What happens to the water that will not be absorbed on the school grounds? Where does it go? What effect does this have on the community? Is the runoff water an asset or a liability to the community?

Additional Thought Questions:

1. Should city planners and land developers consider the proportion of land surfaces to be covered with non-porous material? Why? Sould there be legal considerations required for such?
2. What considerations should city planners and land developers give to the annual rainfall of an area?
3. Assuming one-quarter of an inch of rain fell in a period of one hour on this school year, how many gallons would be collected from the non-porous (ashphalt, concrete, and building) surfaces? (Figure one cubic foot of water is equal to five gallons.)

"TEN-MINUTE WALK"

Grades 3-5

Concepts:

1. Non-living things can be damaged or destroyed by weather.
2. Living things are affected by the physical forces of nature.
3. Different materials corrode at different rates.
4. Surfaces can be treated to slow down corrosion.

Activities:

1. Observe the direction of growth of the trees and shrubs.
2. Look at and feel the surface of the asphalt bordering the south side of the tennis courts.
3. Locate and feel unpainted boards or other wooden materials exposed to the weather for a long period of time. Compare with similar objects that have either been protected from the weather inside the building or that have been painted.
4. Locate, look at and feel metal exposed to the weather such as a chain link fence, pipes, playground equipment, etc.

Questions:

1. Do similar objects inside and outside the building have different appearances and surface textures? How do they appear similar? Different?
2. In what way does a corroded object feel different than a similar uncorroded object?
3. How does an unpainted board exposed to the weather for a long period of time feel? Why? What color is it?
4. Do all metal objects seem to corrode at the same rate on the entire surface? If not, why not?
5. How was the asphalt applied? Did it originally have a smooth surface? Why are so many rocks exposed now?
6. Do the trees around the building all grow vertically? If they ten to lean, do all lean in the same direction? If so, w

Additional Thought Questions:

1. What purposes does paint serve when applied to wood and metal?
2. Are all metals subject to corrosion? If not, what are some of the ways in which noncorrosive metals could be used? What are some of these metals.
3. What forces of nature tend to corrode or erode stone? Metal? Wood? Are all affected in the same way?
4. Can living plants receive too much sun (become sunburned)?
5. Do living plants corrode? If so, are they eventually killed by the action? Can they repair themselves? Why?
6. Is corrosion always harmful? If not, why?

"TEN-MINUTE WALK"
GRADES 2-5

26

Concepts:

1. Trees have different parts.
2. Trees influence their environment and are influenced by their environment.
3. Man plants trees for his own benefit.
4. A tree is a community.
5. Trees grow in length from the tips.
6. Tree trunks and limbs grow in diameter from tissue just beneath the bark.

Activities:

1. Make the following observations:
   a. Feel the trunk bark.
   b. Scratch the bark carefully, then smell it.
   c. Note the bark coloration on all sides of the trunk.
   d. Locate a scar where a limb has been cut off and observe any scar tissue and annual growth rings.
   e. Examine to the tip of an accessible limb and observe the buds, scars, bark, texture, and any indication of growth lines.
   f. Measure the circumference of the trunk approximately one foot above the ground, then at, five feet.

Questions:

1. Is the bark texture the same all around the trunk? Is it the same from the base to the top of the trees? If it varies?Why?
2. Did you see or feel any evidence of damage to the trunk? What caused it? Is there evidence of the tree repairing the damage? Can man do anything to help the tree repair?
3. Is there evidence of any organisms living on or in the trees?
4. Is there an odor to the scratched bark? How would you describe the odor?
5. Does the bark color vary as you go around the trees? Up the trunk? Along the limbs? If so, why?
6. Approximately how old was the limb when it was cut?
7. What is a bud and/or what will it become? Is there evidence of buds from previous seasons? Would this give an indication of a limb's age? If so, why?
8. What is the diameter of the trunk at one foot and five feet? If they differ, why?

Additional Thought Questions:

1. Why does man plant trees? Discuss.
2. If a nail is driven into a tree at the height of 5 feet in 1970, approximately how high will it be in 1975?
3. Why do we--or should we--paint damaged areas of trees?
4. What function(s) does the bark perform for the tree?
5. How many trees occur naturally on the school grounds? How many are introduced (planted by man)?
6. Does the temperature vary on the north and south side of a tree? If so, why? Would this have any effect on the types of vegetation that would grow around the tree?
7. Do trees make land more, or less, valuable? Why?
8. Would any kind of tree grow on this school ground? How could we find out?

Topic: Life Forms Suggested Grade Level: all. Locality: Look under procedure

Activity or Problem: Adaptations for winter survival.

Background needed: Start with the premise that all species survive the winter. This may be developed in a discussion prior to the field work. Some of the types of adaptations should be previewed in this discussion:

Migration to warmer latitudes
Migrations to lower levels of soil or water
Migrations into sheltered area - caves, hollow trees, buildings, etc.
Coping directly with cold
Dormancy
Increased activity and food intake
Changes in color and body insulation
Use of insulated nests

Specific ECO objective: Students will explore adaptations of organisms that help them survive the conditions of winter.

Anticipated outcome: (concepts) The understanding that life continues through the winter months.

Procedure: Working in teams of two or three, students will investigate a number of winter habitats - observing conditions as well as the kinds of organisms found in these habitats. (It may be permissible to collect samples of some of the organimsm for additional indoor observing).
Suggested habitats:

Under and inside rotting logs
Under shaggy bark of trees
Inside plant galls
Among leaves on ground
In top layer of soil, no more than one foot deep
In lower layer of soil, more than one foot deep
In debris at botttom of pond
In debris at bottom of stream
Among stones at bottom of stream
Among first-year leaves of mullein
In unheated buildings and hollow trees
In caves or cellars
In heated buildings
In snow banks

A follow-up discussion based on the field work may be used to summarize the findings.

Materials needed: (Teacher's responsibility) Pencil, note book, collecting jars and any digging equipment available.

Thermometers, , Shovels, trowels, hand ax,

Topic: Life Forms Suggested Grade Level: 3, 5, or 7 Locality: timber tract

Activity or problem: Be a twig detective - winter or early spring activity.

Background needed: Some skills in tree identification - at least, by the leaves if not the bark and tree shape. Vocabulary of twigs - terminal bud, leaf scar, bundle scar, lenticels, bud scars.

Specific ECO objective: While visiting a timber tract, students will investigate the complexity of the interrelationships of life in a forest.

Anticipated outcome: (concepts) Students will become more aware of the differences in the growth of various trees - the growth per year in twigs (length and diameter), the way leaves and new twigs emerge, factors influencing the growth, the means by which buds are protected during the winter.

Procedure: Students will observe twigs of many types of trees.

Observe bumps and markings on a twig, especially the buds. Locate terminal buds and side budgs.

Examine and compare the bud coverings of different trees to see how they protect the tissue inside the buds.

Look at the base of terminal buds to see where scars will be left by bud scales when they fall away from the base of an opening bud. Find bud scars on the same twig which indicate the amount of new growth each year. Measure the growth using a tape measure to find length and calipers to find the increase in diameter.

Locate leaf scars on a twig which show where leaves were growing.

Use a magnifying glass to examine a leaf scar in order to see bundle scars. Compare the number of bundle scars on several leaf scars on a twig and note any differences.

Notice small speckles along the bark of a twig. These are called lenticels. Air goes into and out of the twig through them.

Clip some twigs from trees or shrubs and bring theme indoors. Place them in water near a window to observe the development of buds. Students should be able to observe the opening of bud coverings.

Compare the yearly growth of twigs between trees of the same or different species.

Continue to observe the twigs of trees as spring progresses. They should be able to see that side buds usually grow into leaves and flowers. The terminal bud grows into a new twig.

Materials Needed: Pencil, note book.
Hand Lens, pruning shears, tape measure, caliper (for measuring diameter of a twig.)

Topic: Life Forms Suggested Grade Level: 5 Locality: park area

Activity or problem: Story in a tree stump.

Background needed: Observation skills, understanding of time.

Specific ECO objective: While visiting a timber tract, student will investigate the complexity of the interrelationships of life in a forest.

Anticipated outcome: (concepts) Students will note the abundance of live forms and evidence of life in the decaying tree. They will realize that the history of a tree is briefly related in the stump.

Procedure: Students will observe a large, old stump in a forest area and investigate:

1. How old was the tree?
2. Why are the rings different distances apart?
3. At what time of year do you think the tree grew the most?
4. What kind of tree was it? (deciduous, coniferous, or more specific)
5. What evidence can be found of animals that have visited or used the stump? (tunnels of ants, beetles, spiders, rodents, bird droppings, partly-eaten acorns, etc.)
6. What plants are growing in the stump dust?
7. Are there any signs which tell you what may have happened to the tree?
8. What will eventually happen to the tree?
9. Do you see any signs of what might happen in the area where this tree once stood? (seedling?)

Materials needed: (Teacher's responsibility) Pencil, note book.

Hand Lens

Suggested evaluation: Have students dramatize the life story of the tree including factors affecting its growth. Creative writing experience - writing about the life of a tree as though the student was the tree.

Topic: Soils Suggested Grade Level: 5 Locality: city park or farm area

Activity or problem: Investigation of soils.

Background needed: Be able to measure a given amount of water accurately. Be able to read a timer or at least see the importance of accurate timing.

Specific ECO objective: While visiting a natural growth area and a cultivated area, students will conduct soil investigations.

Anticipated outcome: (concepts) There are characteristic environments, each with their characteristic life. Student should recognize that location can have much to do with the rate of infiltration.

Procedure: The student will determine the rate of infiltration of water in various soil types using location as the type determining factor.

Types of locations should include:

1. plowed field
2. grass land
3. area under broad leaf trees
4. area under evergreen trees
5. hill slope
6. valley floor
7. hill top
8. flower garden

The student should take uniform cans that have had both ends removed, place the can firmly against the ground and pour a measured amount of water into the can and time the interval until all the water has disappeared from view.

Materials needed: (Teacher's responsibility) Pencil, note book, 10 uniform cans with ends removed.

Timing device.

Suggested evaluation: Students should prepare a bar graph indicating rate of infiltration for each type location.

Topic: Soil Suggested Grade Level: 5 Locality: As indicated under Procedure

Activity or problem: Life in the soil

Background needed: Recognition of different kinds of life forms, observation skills.

Specific ECO objective: While visiting a natural growth area and a cultivated area, students will conduct soil investigations.

Anticipated outcome: (concepts) Students will become aware of the many kinds of life in the soil. They will see that the numbers and varieties of organisms change with the location of the soil.

Procedure: Students will:

Look for life in the soil by digging soil samples about a foot square and 6" deep) from a wooded area, a meadow, the edge of a swamp, and eroded field, etc.

Break the soil into bits or sift it through a screen.

Record the kinds and numbers of different plants and animals found in each sample. Sketches might be included. The way plants and animals are categorized will vary at grade levels. It may be based on just plant and animal or much more specific.

Materials needed: (Teacher's responsibility) Pencil, note book, containers.

Spade, screen, keys for classifying and identifying and identifying soil life, berlese separator.

Suggested evaluation: Teacher evaluation of student observations and records, checklist of probable conclusions which might be drawn from observations.

Field Experience I
Fifth Grade
Title III, ESEA

FIELD STUDY OF SOIL

Materials

Small Shovel
Sample bags

General Survey

What is soil? How important is soil? Why do we need soil? Are there different kinds of soil? How is soil made?

Forest Site

Examine Soil Profile

What do you see? Do small animals live in the soil? Are there many layers in the soil? How many? What are these layers? What is the texture of the soil? Who or what benefits from the soil? How was the soil made?

Prairie Site

Examine Soil Profile

What do you see? Do small animals live in the soil? Are there many layers in the soil? How many? What are these layers? What is the texture of the soil? Who or what benefits from the soil? How was the soil made?

How Is Soil Made?

Weathering, water freezing, plant growth, erosion (water, wind)

Follow-up Studies

Is there air in the soil?
Soil sorting
Heating and cooling affects rock
Erosion study
Do animals live in the soil?

Reference: MacKillican, William. Studying Soil. Toronto: The Ryerson Press, 1970.

Field Experience I

ENERGY, FOOD CHAINS & WEBS

Sun - original source of energy.

Green plants - take energy, minerals, water, convert to food (producer), they are the only organism that can convert sun's energy.

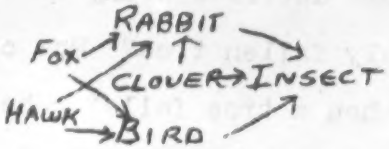
Consumers - animals that live off plants or other animals.

Predator - animal that eats other animals.

Prey - animal that gets eaten.

Food chain - shows how energy is passed on from one organism to another,
- Producer ⟶ consumer ⟶ predator
- clover ⟶ eaten by rabbit ⟶ eaten by fox.

Food web -
more complex



These concepts could easily be taught in the out-of-doors using the organisms that live near the school as examples or even acting out a food web using cards the children could label and twine string for the web.

Materials needed: Either, none at all or cards, markers, and string.

Follow-up - Constructing food chains.
- Try to make a food web for everything that lives in an area such as the school ground.

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Field Experience I

Fifth Grade

Title III, ESEA

Field Study of a Rotting Log

Materials needed:

Small magnifying glasses

Insect Guide

Fungi Guide

General survey before detailed study

Old log or newly fallen tree? How can you tell?

What happens when a tree falls? What forces of nature go to work on dead tree?

Where is this tree located? Does its location have anything to do with the rate of decay?

I. Forces of nature

A. Weather

1. Rainfall
2. Frost
3. Forest cover
   a. How effects decay
   b. Compare with log in more open area
   c. Compare with log in a swampy area

II. Insects

A. Kinds

B. What they do

C. Examples

D. Why more in some places than in others

Field Study of a Rotting Log

III. Plants
   A. Lichens
   B. Fungi
   C. Small plants

IV. Work of plants
   A. Root systems
   B. Acids
   C. Moisture preservers
   D. Plant succession

V. Final decay
   A. Final result
   B. Good of this

VI. Reasons for leaving the log undisturbed
   A. Enriches forest
   B. Other people may want to study it

Field Experience I
Fifth Grade
Title III, ESEA

Forest Study

Materials
Tree Guide

General Survey

What are our five senses? Can we use them to study the forest?

Sight-

What do you see the most of? Are these things you see the only living things in the forest? What other things could live in the forest? Do you see their homes? Describe everything you see.

Hearing-

Do you hear any sound or sounds in the forest? Describe the sounds? What or who is making these sounds?

Feeling-

What do you feel as you stand in the forest? Describe what it is you feel? What do the trees feel like? What do their leaves feel like? Do all trees feel the same? What do the bushes feel like? What does the ground feel like? Describe all the feelings you are getting.

Smell-

Does the forest have any odors? Do the trees have any odors? The bushes, do they have any odors? The leaves, do they have any odor? Does the ground have an odor? What makes the ground smell like it does?

Taste-

There are many things in the forest that can be tasted, but use caution when doing so. Be sure you know the plant!

POTTER'S MARSH
ENVIRONMENTAL STUDY

Circle the effect which you feel each of the following has on the environment. Be able to support your answers.

1. The flooding caused by the Lock & Dam created the stump fields, the backwaters, and the swamp lands. We want you to tell us what effect each has had on the environment.
   A. What effect does the stump fields have on the environment?
      Good Bad No Effect
   B. What effect does the backwaters have on the environment?
      Good Bad No Effect.

2. Potters Marsh has been converted into a Public Use area to be used for camping, fishing and boating. What effects does each of these items have on the environment?
   A. Camping has a good effect, bad effect, or no effect on the environment.
   B. Fishing has a good effect, bad effect, or no effect on the environment.
   C. Boating has a good effect, bad effect, or no effect on the environment.

3. What effect do you think the development of Potters Marsh area has had on the wildlife such as deer, birds, squirrels, fish,etc. List some of the effect you can think of.

_____

_____

4. The Mississippi River, like any river has natural spring flooding. Different types of things have happened to the Potters Marsh area because of the flooding. The Army Corps of Engineers has had to put riprap along the shore, and when the flood waters go down it can leave stagnant pools of water around the camp grounds. What effect has all of this had on the environment?
   A. What effect does the riprap have on the environment?

   _____

   B. What effect do the stagnant pools have on the environment?

   _____

5. As we have seen Potter's Marsh has been developed into a recreational area. This may or may not have some effect on the community of Thomson.
   A. How has the development of Potter's Marsh effected our paved roads in and around the Thomson area? No effect, good effect, or bad effect.
   B. Has Potter's Marsh recreation area effected the residents of Thomson? No effect, good effect, bad effect.
   C. How has Potter's Marsh area effected the business like Tom's Super Valu, Krahn's, Jerry's, the Rolling H? Good effect, Bad Effect, No Effect.

6. What do you think the effects on the environment would be if Potter's Marsh area was to be developed into an even bigger recreational area? Good Bad No Effect Why?

_____ _____

_____

RIVERVIEW

ENVIRONMENTAL EFFECTS ON THE AREA

A. List the things that you see that would have an effect on the environment. Tell if they had or have a GOOD, BAD OR NO EFFECT on the environment. Be able to support your answer.

1. PEOPLE (List 3 things that people do which have an effect on the environment here at Riverview.)

   a. _____

   b. _____

   c. _____

2. HOUSING DEVELOPMENT

   (List 4 ways which the housing development has effected the environment here at Riverview.)

   a. _____

   b. _____

   c. _____

   d. _____

3. ANIMALS

   (List 4 ways that animals have effected the environment at Riverview.)

   a. _____

   b. _____

   c. _____

   d. _____

4. Where does the sewage go?????????

   _____

   _____

THE FOLLOW UP

The work sheets used on the trip are only briefly discussed, due to the lack of time, and therefore we ask you to use them as a follow-up to the Field Experience.

POLLUTION AND SOLUTION

This activity is designed to enhance the student's ability to recognize environmental problems. Through the use of a number of overhead transparencies, the students are asked to examine the area, identify the problem and cite some solutions. There are some pollution problems identified that the students will have difficulty recognizing. These problems, although not as noticeable as air and water pollution, still need identifying and solving. The types of problems shown are: air pollution, water pollution, unsightly landscape, soil erosion and soil depletion.

The overhead transparencies are part of the Conservation Science Series and include pollution, soil depletion and erosion. See transparencies packet.

* * * * *

TOUR OF LOCAL SEWAGE TREATMENT PLANTS

Tours of local sewage treatment plants can be easily arranged by contacting your local plant manager. Consult the Directory of Educational Resources for names and places to be contacted.

* * * * *

INFORMATION EXPLAINED DURING TOUR OF AREA SEWAGE TREATMENT PLANTS

SEWAGE DISPOSAL

PRIMARY - REMOVAL OF SOLID WASTE
SECONDARY- PURIFYING WASTE WATER, USING BIOLOGICAL PROCESSES

PRIMARY I. Screen out solids

A. Go through screens varying from coarse to fine
B. May be ground fine.

II. Grit Chamber
A. Small particle settle to bottom, raw sludge
B. Usually disposed of by land fills.

III. Effluent (Water with dissolved and suspended particles) Chlorinated and returned to streams.
A. This process now considered inadequate.
B. Increased amounts of wastes need further treatment.

SECONDARY I. Secondary treatment revoves up to 90% of organic matter in sewage.
A. Trickling filters
B. Activated sludge

II. Trickling filters
A. Sewage passes through bed of stones
1. Bacteria consumes most of organic matter.
2. Flows over stone bed or is sprayed over the bed.

Activity #4 Group #_____

Equipment: Rule, Track Cards

ANIMAL TRACKS

Examine the area trying to find three different animal tracks. For each set of tracks you find answer the following questions or do the experiment asked.

A. Measure the distance between each step or track the animal made.

1. _____ 2. _____ 3. _____

B. Measure the depth of each print.

1. _____ 2. _____ 3. _____

C. How was the animal traveling? (walking, running slowly or running fast)

1. _____ 2. _____ 3. _____

D. Note places where the animal may have stopped. Why did it stop?

1. _____ 2. _____ 3. _____

E. How were the front legs different from the hind legs?

1. _____ 2. _____ 3. _____

F. What kind of animal do you think it is? (a climbing, burrowing, flying or running animal)

1. _____ 2. _____ 3. _____

G. Using the track card try to identify the animal from the tracks.

1. _____ 2. _____ 3. _____

Sketch each track

1. 2. 3.

Activity #5 INTERDEPENDENCE OF LIFE Group #_____

Each group is asked to find 2 examples of the interdependence of life as found in the woods.

Interdependence means: depending upon one another.

1. Find examples of the interdependence of one plant to another. Explain the relation these plants may have.

   A.

   B.

2. Find examples of the interdependence of one animal to another. Explain the relationship these animals may have.

   A.

   B.

3. Find examples of the interdependence of one plant to an animal or an animal to a plant. Explain the relationship they may have.

   A.

   B.

4. Draw a winter food chain.

Activity #6 Group #_____

TEMPERATURE

Measuring temperature in the out-of-doors can show us many different mini-climates that are all around us.

In the area you are assigned take the following measurements, record your results and come up with some conclusions.

Remember to always leave your thermometer in place long enough for the liquid to adjust to the new surrounding.

_____1. Take the temperature of the snow put in an open area. (Use ground thermometer)

_____2. Take the temperature of the snow in a sheltered area (next to a tree out of the wind). (use ground thermometer)

_____3. Measure the air temperature in the same open place and in the same sheltered area as you have just done with the snow. (Use the air thermometer.)

_____4. Measure the temperature of the snow in different types of snow.

_____Snow in Sun _____Packed Snow

_____Snow in Shade _____Loose Snow

_____5. What range of temperatures did you find for the areas of snow tested?

_____6. What was the average temperature?

7. How did the snow temperature differ from the air temperatures?

_____

_____

8. What conclusions can you come to over the differences in air and snow temperatures in the different mini-climates you just tested.

_____

_____

_____

_____